PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing: 17 June 1999 (17.06.99)	
International application No.: PCT/GB98/03555	Applicant's or agent's file reference: A25503/WO
International filing date: 27 November 1998 (27.11.98)	Priority date: 09 December 1997 (09.12.97)
Applicant: McGRATH, Andrew, John	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:

28 April 1999 (28.04.99)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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avatars of the other users, and not his own, from a viewpoint such that the relative positions of each avatar to each other avatar and to the user's viewpoint is consistent between users. For example, with reference to Figure 2 of the drawings attached to this specification, if a user "3" is shown a representation of the meeting space in which the avatar of user "1" is facing him, with avatars of users "2" and "4" facing each other at 90° to the viewpoint of user "3", then the user "4" would see the avatar of user "2" facing him, and the avatars of users "1" and "3" facing each other at 90° to his viewpoint. This gives a more realistic representation of a real conference room, but the relative positions of the users make it difficult to view all the users and other elements of the conference facility at the same time on a conventional video monitor.

In the Fujitsu reference mentioned previously, the avatars of the other users are arranged around the user's virtual viewpoint, as if on a turntable, which can be rotated to bring a selected avatar into view. The user represented by that avatar will not necessarily be looking at the first user's avatar. Thus eye contact is not necessarily two-way, and participants will not interact as they would in a real space as two avatars which appear adjacent to one user will not necessarily appear so to another user.

Furthermore, events taking place in the meeting space, such as an individual operating the "whiteboard", or joining or leaving the meeting, require complex navigation around the virtual space in order to be reasonably realistic. In both systems, such navigation requires considerable thought on the part of the user, to ensure that unrealistic occurrences, such as one user walking through another, or through the furniture, do not take place. Such distractions can disrupt the conduct of the conference itself. Furthermore, if a drawing facility is provided, it can only occupy a portion of the view, making it difficult to use.

According to the invention, there is provided a method of representing users on a display device in a telecommunications conferencing facility by means of graphical representations corresponding to the respective users, wherein the users are depicted as carrying out symbolic actions, relating to the various events taking place during the virtual telecommunications conferencing process, the users and their activities being represented to each user by means of graphical representations, and characterised in that symbolic positions and movements of

the representations of each user are selected according to the viewpoint of each user.

6. According to a second aspect, the is provided a telecommunications conferencing system comprising display control means for representing users on display devices by means of graphical representations corresponding to the respective users, the display control means being arranged to depict symbolic actions carried out by users, relating to the various events taking place during the virtual telecommunications conferencing process, and for presenting, to each user, a representation of the other users and their activities;

characterised in that the display control means is arranged to represent the presence and activities of each user to each other user by means of symbolic positions and movements, selected according to the viewpoint of the user to whom the view is presented.

This invention allows the realistic representation of a meeting by providing a "meeting space" which is consistent from the viewpoint of each user, without necessarily being consistent between users.

The more inconvenient aspects of a real meeting space can be eliminated, rather than emulated. For example, the accessing of a facility by one user for viewing by other users can be represented in a different manner for the viewing users and the accessing user, and users not currently actively engaged in the telecommunications conference can be represented in a different manner from those currently viewing the conference.

Activities such as providing copies of documents may be represented symbolically, and social cues may also be represented, in response to specific commands from the individual users.

Each user's representation of the meeting space may be arranged such that all other elements of the meeting space, including the other users, appear within a narrow and preferably fixed field of view, corresponding to his own display device's dimensions. For example, a user with a wide-screen panoramic display device may depict the other users spaced further apart than would a user with a much smaller screen, for example on a lap-top computer.

This improves the ease of use of the system by each user in the meeting space, as changes of viewpoint are not necessary. It allows all users to see each

other without changing viewpoint, which is not possible even in a real meeting space.

The operation of the invention can take place by interaction between a central "server", and a plurality of client devices. The central server controls those aspects of the system common to all users, such as information relating to the activities to be depicted, and the client devices are responsible for those aspects specific to each user, such as actions taken by the respective user, information on which is transmitted to the server for depiction on the other user terminals.

The invention will now be discussed in greater detail with reference to the drawings.

Figure 1 represents the general configuration of a system arranged to operate the present invention,

Figure 2 is a representation of a virtual meeting space according to the prior art,

Figure 3 and 4 are a representations of a virtual meeting space according to the invention,

Figures 5 to 12 are various representations of the virtual meeting space as seen by different individual users in different circumstances as will be described.

In Figure 1 there is shown an arrangement to allow four users 1, 2, 3, 4 to interact in a virtual teleconference. Each user has a respective human/machine interface unit 21, 22, 23, 24, which includes all the necessary video and audio equipment for the user to see and hear what is happening in the virtual meeting space, and the necessary user input devices (e.g. keyboards, computer "mouse" etc.) to provide input to the virtual meeting space. Each interface, 21, 22, 23, 24 is connected to a respective client apparatus 11, 12, 13, 14 which provides an interface between the user and a main server 10 which controls the operation of the meeting space. The server 10 has, as a further input, a store 30 which maintains permanent data defining the virtual meeting space. The control of the meeting space is carried out by interaction between the client apparatuses 11, 12, 13, 14 and the server 10. In some embodiments most of the display control functions may take place in the server 10, but in systems where the display apparatuses 21, 22, 23, 24 are dissimilar, more of the display control functions may be different for each apparatus, therefore requiring more of the display control functions to be distributed in the client apparatus 11, 12, 13, 14.

In response to inputs from one of the users (e.g. user 1) through his respective user interface (21) the client apparatus transmits these inputs to the main server 10 which, in accordance with the meeting space definition 30, controls the images to be represented on the other users screen 22, 23, 24 to represent the activities of the user 1, input through interface device 21. As a very simple example, the actions of the user 1 when first establishing contact with the meeting space are translated by the client computer 11 and converted by the server 10, into a representation of the user 1 entering the meeting space, which is in turn passed to the individual clients 12, 13, 14 to be represented as the avatar of the user 1 moving into the field of view of the display devices 22, 23, 24.

The manner of representation of the individual user 1 in the virtual space may be selected either by the user 1 through his respective client device 11, or by each receiving user 2, 3, 4 in the meeting space, who may each select an avatar according to his own requirements to represent the user 1. Similarly, some parts of the virtual meeting space may be defined centrally in the meeting space definition unit 30, whereas other aspects may be defined by each individual client 11, 12, 13, 14 independently of the others. Such definitions may include colour schemes, the relative locations of the individual users 1, 2, 3, 4, etc.

In Figure 2 is shown a representation of a prior art virtual meeting space. It will be noted that the virtual meeting space shows four users 1, 2, 3, 4, located at equally spaced intervals around a table 31. It will be noted that in order for any user (e.g. user 3) to clearly see all the other users (1, 2, 3, 4), a fairly wide angle of view is required. In order to view different users the direction of view must be changed, and it is difficult to view all members of the virtual conference simultaneously. This problem obviously increases, the more people are taking part in the conference. Furthermore, if there are items such as a representation of a "whiteboard" in the meeting space, it cannot be visible to all participants at once, as if it is facing user "1", for example, the avatar of user "3" will be facing away from it. It will therefore not appear in his field of view.

Figure 3 shows a virtual meeting space in the system according to the invention as seen by a user 3. It will be noted that for the user 3 the three remaining users 1, 2, 4 now subtend a much narrower angle.

Figure 4 shows the same virtual meeting space, but seen from the viewpoint of a different user 4. It will be seen that the other users 1, 2, 3 also

subtend a narrow angle as seen from the user 4, in the same way that in Figure 3 the users 1, 2, 4 subtend a narrow angle as seen from the user 3. The server 10 and clients 11, 12, 13, 14 are arranged to represent the relative positions of the avatars according to this distorted co-ordinate system, such that for each user the other users subtend a relatively narrow angle and may all appear within the same field of view. It will be noted that although the angular distance between the users is different from each viewpoint, the order in which they appear around the table is preserved. This allows sociological cues, such as interactions between neighbours around a table, to occur consistently regardless of the viewpoint.

Figures 5 to 12 show various representations of the virtual meeting space, as viewed by different individual users 1, 2, 3, 4, in different circumstances. The avatars representing each user are indicated by reference numerals 1, 2, 3 and 4. For clarity in this description, the avatars for each user has a respective shape, which is consistent between viewpoints, but as has been discussed, each user may choose to represent a particular participant in a different way in his own viewpoint. The viewpoint represented in each figure is indicated by the reference numeral relating to the user terminal on which the view is being represented. Therefore, Figures 5, 7, 8 and 9 show the view as seen on user terminal 21, belonging to user 1; Figure 6 and 12 show the view on terminal 24, belonging to user 4, and Figures 10 and 11 represent terminals 22 and 23 respectively, in use by users 2 and 3 respectively. Common to all the virtual meeting space images are the avatars of the other users 1, 2, 3, 4, a table 31 and a "whiteboard" 32. Other elements will be described with reference to the figures in which they are represented. It should be noted that for each user, all other users and elements of the meeting space are in full view, without any need to change viewpoint. This is so, despite some elements appearing, to one user, to be behind another user.

Figure 5 shows schematically the view of the virtual meeting space as seen by one of the participants 1. Users 2 and 4 are also taking part in the teleconference; this can be seen by the full representation of the avatars 2 and 4 in their respective positions around the table 31. User 3, although allocated a position in the virtual meeting space has not yet entered the meeting space, and his avatar is replaced by a representation of an empty seat 3. Users 2, 3, and 4 are represented as subtending an angle of approximately 90°, with the avatars of

users 2 and 4 each at approximately 135° from the angular position around the table 31 of the viewing user 1.

Figure 6 shows the same situation as viewed by another user 4. It will be seen that the view is the same as that in Figure 5, except that user 1 is represented instead of the user 4. Note that the relative positions around the table are preserved i.e. user 3 is still to the left of user 2, but the angular distance between users is not the same as in Figure 5. In the meeting space as viewed by the user 4, users 1 and 2 are separated by only approximately 45°, with the users 1 and 3 at approximately 135° angular position from the viewing user 4.

Figure 7 represents the view of the meeting space as viewed by the user 1, in the situation where two of the users 2, 3 are conducting a conversation between themselves, using a separate connection. The avatars of the users 2 and 3 are shown as facing each other and closer together than in other views, indicating that they are not currently primarily concentrating on the meeting space. The facility for private discussion (conferring) may be provided in virtual meeting spaces in order to allow discussion between two parties, for example to agree a negotiating position before presenting it to the meeting at large.

A user may indicate that he wishes to close the conference in the near future, or to withdraw from it, by entering a command to the server. The server responds by causing the avatar of that user to perform an action representative of activities performed by real people in such a situation.

Such actions may include putting papers into a case, looking at a clock (if one is present in the virtual meeting space) or at a wristwatch, as shown in Figure 7 (user 4), or putting a coat on. Different actions may be represented each time the user activates the command, to indicate increasing proximity to the closure time. The user may pre-programme such cues to appear at predetermined times leading up to the desired closure time.

Figure 8 is a representation in which the user 2, although still connected to the meeting space, is consulting a document. This can be done by the user 2 by calling up the relevant document on his computer screen (for example by 'clicking' with a 'mouse'), the meeting space typically being relegated to a small representation of the meeting space in one corner of the viewpoint of the screen. The system shows the avatar of the user looking at a representation 33 of a

document on the table 31, to represent to the other users, e.g. user 1, the fact that the user is primarily studying something other than the meeting space.

Another user 1 may obtain a copy of a document by performing an action on it (e.g. 'clicking' a mouse cursor). Subject to the document not being copy-protected, (which may be indicated by some characteristic of the representation of the document, e.g. its colour), the user 1 can then obtain a copy of the document. Alternatively the user 2 who holds the document may perform some action to copy the document to one, some, or all of the other participants. A representation 33a of the copy will be shown in the user space as moving from the user 2 to the other user or users.

Figures 9, 10, 11 and 12 represent the viewpoints of the individual users 1, 2, 3 and 4 when a user (user 1 for example) wishes to use the "whiteboard" facility of the virtual meeting space. In order to access this facility the user 1 may carry out predetermined input in the user interface unit 21 in order to indicate that he wishes to use the whiteboard. For example, he may use a "mouse" to "click" on the whiteboard space 32 represented in viewpoint 21. This will cause the screen representation 21 to change to a full screen view of the whiteboard 32 as shown in Figure 9. A cursor 35 is present to allow the user to draw a diagram 34 etc. on the whiteboard 32. The view of the meeting space is relegated to an inset 21a.

From the points of view of the other users 2, 3 and 4, the avatar of the user 1 is represented as moving from his respective position around the table 31 (which is of course different for each user) towards the representation 32 of the whiteboard (whose position relative to the avatar of user 1 is also different in each viewpoint). The movement of the avatar 1 to the whiteboard 32 is therefore different in each case, because of the different viewpoints. Furthermore, the user 1 is not required to 'navigate' around (or through) the virtual table 31 to reach the whiteboard 32.

It will be noted that in each viewpoint the whiteboard 32 appears in the field of view. However, each user sees the whiteboard 32 positioned behind a different other user. For example, in Figure 5 it will be seen that from the viewpoint of user 1 the whiteboard 32 is behind the avatar of user 4. In Figure 6, the whiteboard 32 seen by the user 4 is behind the avatar of user 3. Thus, unlike in a conventional virtual meeting space (or indeed a real meeting space), no user

perceives the whiteboard as being behind himself: each user perceives the whiteboard as behind someone else. Thus each user will find the whiteboard is within his field of view.

Movements, positions, and other attributes of the individual users are thus represented symbolically in the virtual meeting spaces. Each user will see the other users' avatars behaving in an appropriate way for activities taking place during the meeting, although the users will have a different view as to the detail of such activities, e.g. the distance that another user has to move in order to access an element, the relative distances between avatars, and even the appearances of the individual avatars and the fixed parts of the meeting space.

CLAIMS

1. A method of representing users (1, 2, 3, 4) on a display device (21,22,23,24) in a telecommunications conferencing facility by means of graphical representations corresponding to the respective users, wherein the users (1,2,3,4) are depicted as carrying out symbolic actions, relating to the various events taking place during the virtual telecommunications conferencing process, the users (1,2,3,4) and their activities being represented to each user (1,2,3,4) by means of graphical representations, and characterised in that symbolic positions and movements of the representations of each user (1,2,3,4) are selected according to the viewpoint of each user (1,2,3,4).

2. A method according to claim 1, wherein for each user (1), the representations of each of the other users (2,3,4) are arranged such that they are all contained within the field of view of the user's display device (21).

3. A method according to claim 2, in which the symbolic actions are selected such that they take place within a fixed field of view.

4. A method according to claim 1, 2 or 3, wherein the accessing of a facility by one user (1) for viewing by other users (2,3,4) is represented in a different manner for the viewing users (2,3,4) and the accessing user (1).

5. A method according to one of claims 1 to 4, wherein users (3) not currently actively engaged in the telecommunications conference are represented in a different manner from those currently viewing the conference (2,4).

7. Telecommunications conferencing system comprising display control means (10, 11,12,13,14) for representing users on display devices (21, 22, 23, 24) by means of graphical representations corresponding to the respective users (1,2,3,4), the display control means being arranged to depict symbolic actions carried out by users, relating to the various events taking place during the virtual telecommunications conferencing process, and for presenting, to each user, a representation of the other users and their activities;

characterised in that the display control means (10, 11, 12, 13, 14) is arranged to represent the presence and activities of each user to each other user by means of symbolic positions and movements, selected according to the viewpoint of the user to whom the view is presented.

7. Conferencing system according to claim 6, wherein the display control means is arranged to represent, for each user (1), each of the other users (2 ,3, 4) such that they are all subtended within the field of view of the display device (21) of that user (1).

8. Conferencing system according to claim 7, in which the symbolic actions are selected such that they take place within a fixed field of view.

9. Conferencing system according to any of claims 6 to 8 comprising means for accessing a facility by one user (1) for viewing by other users (2 ,3, 4) wherein the accessed facility is represented in a different manner for the viewing users and the accessing user.

10. Conferencing system according to any of claims 6 to 9, wherein the display control means (10, 11, 13, 14) is arranged to represent users (3) not currently actively engaged in the telecommunications conference in a different manner from those (2 ,4) currently viewing the conference.

11. System according to any of claims 6 to 10, comprising client means (11, 12, 13, 14) associated with each user (1, 2, 3, 4) for generating at least part of the user's viewpoint.

12. System according to any of claims 6 to 11, comprising server means (10) accessible by each user (1, 2, 3, 4) for generating at least part of the users' viewpoints.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
A25503/WO		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB 98/03555	27/11/1998	09/12/1997
International Patent Classification (IPC) or national classification and IPC		
H04N7/15		
Applicant		
BRITISH TELECOMMUNICATIONS PUBLIC LIMITED... et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consists of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [ ] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [ ] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [X] Certain observations on the international application

Date of submission of the demand	Date of completion of this report
28/04/1999	28.03.00
Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	ZANELLA C.

International application No.

PCT/GB98/03555

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

I. Basis of th report

1. This report has been drawn up on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*

☐	the international application as originally filed			
☒	the description, pages	1, 4-9	, as originally filed	
	pages		, filed with the demand	
	pages	2, 3	, filed with the letter of	13.12.99
☒	the claims, Nos.		, as originally filed	
	Nos.		, as amended under Article 19	
	Nos.		, filed with the demand	
	Nos.	1-12	, filed with the letter of	13.12.99
☒	the drawings, sheets / fig.	1/3-3/3	, as originally filed	
	sheets / fig.		, filed with the demand	
	sheets / fig.		, filed with the letter of	

2. The amendments have resulted in the cancellation of:

☒	the description, pages:	2, 3
☒	the claims, Nos.	1-12
☐	the drawings, sheets / fig.	

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims	1-12	YES
	Claims		NO
Inventive Step	Claims		YES
	Claims	1-12	NO
Industrial Applicability	Claims	1-12	YES
	Claims		NO

2. Citations and Explanations

D1 = TAKASHI KOUNDO ET AL: "DRAWINGS ENVIRONMENT FOR VIRTUAL SPACE"
IEICE TRANSACTIONS ON COMMUNICATIONS,
Vol. E78-B, No. 10, 1 October 1995, pages 1358-1364,
XP000540872 TOKYO, JP

The subject-matter of independent claims 1 and 6 is not clear (see Box VIII). As far as these claims are understood, their subject-matter lacks an inventive step having regard to the disclosure of document D1.

Independent claims 1 and 6 appear to claim nothing more than a video conference method and system in which a user sees the other participants displayed with a particular representation which depends on the selected view point.

These features, however, are already known from document D1. It is noted that the situation in which all the participants avatars are simultaneously displayed only represents a mode of operation "Intermittor" (see figure 14) and that a user can avoid to display his own avatar, i.e. he can choose to obtain a display of the other participants avatars only (see figure 13).

From the disclosed method and device it is also clear that all avatars are free to move in the virtual space (see page 1360, lines 7-8: "A user can roughly recognise where a partner is watching from the position and orientation of the avatar") and that viewpoints can therefore be freely selected as well. The representation of the other participants' avatars will of course depend on the selected viewpoint (which changes with distance and orientation) and this means that in the disclosed method and system "the representations of each of the other users are in positions and have movements, relative to each other and the viewpoint, selected according to the viewpoint of the user", as claimed for instance in claim 1.

The subject-matter of independent claims 1 and 6 appears thus to lack an inventive step (Art 33(3) PCT. Under due consideration of the general knowledge of the man skilled in the art working in the field relating to telecommunications conferencing, dependent claims 2-5, 7-12 do not appear to contain any additional feature which involves an inventive step when combined with the subject-matter of the claims to which they refer. Some of these claims include the alleged inventive feature of subtending all the remaining partners within the field of view of the display device. It should be noted that this feature is also disclosed by document D1: see figure 13 where a user can move towards or away from the partners, (increasing in this latter case the view field, i.e. the number of observed objects) by means of a navigator.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 1 and 6 do not meet the requirements of Art 6 PCT.

1. The meaning of the following part of the claims is obscure: "... each user being presented with a viewpoint ..." (See the following of the claims where on the contrary a "viewpoint (is) presented to each user").

2. The statement that "... the representations of each of the other users ... are ... selected according to the viewpoint of the users" is vague and open to a multiplicity of unknown possibilities.

avatars of the other users, and not his own, from a viewpoint such that the relative positions of each avatar to each other avatar and to the user's viewpoint is consistent between users. For example, with reference to Figure 2 of the drawings attached to this specification, if a user "3" is shown a representation of the meeting space in which the avatar of user "1" is facing him, with avatars of users "2" and "4" facing each other at 90° to the viewpoint of user "3", then the user "4" would see the avatar of user "2" facing him, and the avatars of users "1" and "3" facing each other at 90° to his viewpoint. This gives a more realistic representation of a real conference room, but the relative positions of the users make it difficult to view all the users and other elements of the conference facility at the same time on a conventional video monitor.

In the Fujitsu reference mentioned previously, the avatars of the other users are arranged around the user's virtual viewpoint, as if on a turntable, which can be rotated to bring a selected avatar into view. The user represented by that avatar will not necessarily be looking at the first user's avatar. Thus eye contact is not necessarily two-way, and participants will not interact as they would in a real space as two avatars which appear adjacent to one user will not necessarily appear so to another user.

Furthermore, events taking place in the meeting space, such as an individual operating the "whiteboard", or joining or leaving the meeting, require complex navigation around the virtual space in order to be reasonably realistic. In both systems, such navigation requires considerable thought on the part of the user, to ensure that unrealistic occurrences, such as one user walking through another, or through the furniture, do not take place. Such distractions can disrupt the conduct of the conference itself. Furthermore, if a drawing facility is provided, it can only occupy a portion of the view, making it difficult to use.

According to the invention, there is provided a method of representing users on a display device in a telecommunications conferencing facility by means of graphical representations corresponding to the respective users, wherein the users are depicted as carrying out symbolic actions, relating to the various events taking place during the virtual telecommunications conferencing process, each user being presented with a viewpoint representative of the position of that user in a virtual space and in which the other users and their activities are represented by means of graphical representations, and characterised in that in the viewpoint presented to each user the representations of each of the other users are in positions, and have movements,

relative to each other and the viewpoint, selected according to the viewpoint of the user.

According to a second aspect, there is provided a telecommunications conferencing system comprising display control means for representing users on display devices by means of graphical representations corresponding to the respective users, the display control means being arranged to depict symbolic actions carried out by users, relating to the various events taking place during the virtual telecommunications conferencing process, each user being presented with a viewpoint representative of the position of that user in a virtual space and for presenting, to each user a representation of the other users and their activities;
characterised in that the display control means is arranged to represent the presence and activities of each user to each other user by means of symbolic positions and movements, presented to each user such that in the viewpoint presented to each user the representations of each of the other users are in relative positions, and have relative movements, selected according to the viewpoint of the user.

This invention allows the realistic representation of a meeting by providing a "meeting space" which is consistent from the viewpoint of each user, without necessarily being consistent between users.

The more inconvenient aspects of a real meeting space can be eliminated, rather than emulated. For example, the accessing of a facility by one user for viewing by other users can be represented in a different manner for the viewing users and the accessing user, and users not currently actively engaged in the telecommunications conference can be represented in a different manner from those currently viewing the conference.

Activities such as providing copies of documents may be represented symbolically, and social cues may also be represented, in response to specific commands from the individual users.

Each user's representation of the meeting space may be arranged such that all other elements of the meeting space, including the other users, appear within a narrow and preferably fixed field of view, corresponding to his own display device's dimensions. For example, a user with a wide-screen panoramic display device may depict the other users spaced further apart than would a user with a much smaller screen, for example on a lap-top computer.

This improves the ease of use of the system by each user in the meeting space, as changes of viewpoint are not necessary. It allows all users to see each

CLAIMS

1. A method of representing users (1, 2, 3, 4) on a display device (21,22,23,24) in a telecommunications conferencing facility by means of graphical representations corresponding to the respective users, wherein the users (1,2,3,4) are depicted as carrying out symbolic actions, relating to the various events taking place during the virtual telecommunications conferencing process, each user (1) being presented with a viewpoint representative of the position of that user (1) in a virtual space and in which the other users (2,3,4) and their activities are represented by means of graphical representations, and characterised in that in the viewpoint presented to each user (1) the representations of each of the other users (2,3,4) are in positions, and have movements, relative to each other and the viewpoint, selected according to the viewpoint of the user (1).

2. A method according to claim 1, wherein for each user (1), the representations of each of the other users (2,3,4) are arranged such that they are all contained within the field of view of the user's display device (21).

3. A method according to claim 2, in which the symbolic actions are selected such that they take place within a fixed field of view.

4. A method according to claim 1, 2 or 3, wherein the accessing of a facility by one user (1) for viewing by other users (2,3,4) is represented in a different manner for the viewing users (2,3,4) and the accessing user (1).

5. A method according to one of claims 1 to 4, wherein users (3) not currently actively engaged in the telecommunications conference are represented in a different manner from those currently viewing the conference (2,4).

6. Telecommunications conferencing system comprising display control means (10, 11,12,13,14) for representing users on display devices (21, 22, 23, 24) by means of graphical representations corresponding to the respective users (1,2,3,4), the display control means being arranged to depict symbolic actions carried out by users, relating to the various events taking place during the virtual telecommunications conferencing process, each user (1) being presented with a

viewpoint representative of the position of that user (1) in a virtual space and for presenting, to each user a representation of the other users and their activities; characterised in that the display control means (10, 11, 12, 13, 14) is arranged to represent the presence and activities of each user (2,3,4) to each other user (1) by means of symbolic positions and movements, presented to each user (1) such that in the viewpoint presented to each user (1) the representations of each of the other users (2,3,4) are in relative positions, and have relative movements, selected according to the viewpoint of the user (1).

7. Conferencing system according to claim 6, wherein the display control means is arranged to represent, for each user (1), each of the other users (2 ,3, 4) such that they are all subtended within the field of view of the display device (21) of that user (1).

8. Conferencing system according to claim 7, in which the symbolic actions are selected such that they take place within a fixed field of view.

9. Conferencing system according to any of claims 6 to 8 comprising means for accessing a facility by one user (1) for viewing by other users (2 ,3, 4) wherein the accessed facility is represented in a different manner for the viewing users and the accessing user.

10. Conferencing system according to any of claims 6 to 9, wherein the display control means (10, 11, 13, 14) is arranged to represent users (3) not currently actively engaged in the telecommunications conference in a different manner from those (2 ,4) currently viewing the conference.

11. System according to any of claims 6 to 10, comprising client means (11, 12, 13, 14) associated with each user (1, 2, 3, 4) for generating at least part of the user's viewpoint.

12. System according to any of claims 6 to 11, comprising server means (10) accessible by each user (1, 2, 3, 4) for generating at least part of the users' viewpoints.

ATENT COOPERATION TREA

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
A25503/WO		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 98/ 03555	27/11/1998	09/12/1997
Applicant		
BRITISH TELECOMMUNICATIONS PUBLIC LIMITED... et al		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. [ ] **Certain claims were found unsearchable** (see Box I).

2. [ ] **Unity of invention is lacking** (see Box II).

3. [ ] The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing
   - [ ] filed with the international application.
   - [ ] furnished by the applicant separately from the international application,
     - [ ] but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
   - [ ] Transcribed by this Authority

4. With regard to the **title,**
   - [X] the text is approved as submitted by the applicant
   - [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   - [X] the text is approved as submitted by the applicant
   - [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:
   Figure No. 8
   - [X] as suggested by the applicant.
   - [ ] because the applicant failed to suggest a figure.
   - [ ] because this figure better characterizes the invention.
   - [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 98/03555

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 491 743 A (SHIIO ICHIRO ET AL) 13 February 1996 cited in the application see column 2, line 1 - line 37 see column 6, line 62 - column 8, line 18 see column 9, line 22 - column 10, line 54 see figures 1-17	1-3,5-8, 10-12
A	EP 0 516 371 A (FUJITSU LTD) 2 December 1992 cited in the application see page 3, column 4, line 7 - line 19 see page 6, column 9, line 22 - column 10, line 45 see figures 3,17-23	1-12

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 February 1999	17/02/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Van der Zaal, R

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Form PCT/ISA/210 (second sheet) (July 1992)

International Application No
PCT/GB 98/03555

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	TAKASHI KOUNO ET AL: "DRAWING ENVIRONMENT FOR VIRTUAL SPACE" IEICE TRANSACTIONS ON COMMUNICATIONS, vol. E78-B, no. 10, 1 October 1995, pages 1358-1364, XP000540872 TOKYO, JP see page 1358, right-hand column, line 36 - page 1361, left-hand column, line 26	1-12

INTERNATIONAL SEARCH REPORT

[redacted]ation on patent family members

[redacted]ternational Application No
[redacted]CT/GB 98/03555

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		US 5257306 A	26-10-1993